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THE MUSICAL TIMES, And Singing Class Circular.

OCTOBER 1st, 1862.

A DRAUGHT FOR THE PARTICULAR HISTORY OF PHONICS: OR, THE DOCTRINE OF SOUND AND HEARING.

*From LORD BACON'S "SYLVA SYLVARUM."**(Continued from page 306.)*

SECTION III.

THE MAGNITUDE, SMALLNESS, AND DAMPS OF SOUNDS.

Let one person whistle at one end of a shooting trunk, whilst another holds his ear at the other end; and the sound will strike the ear so sharp as to be scarce tolerable: for sound naturally diffuses in a sphere, and so spends itself; but if made to go in a canal, it must needs acquire greater force. And thus enclosures not only preserve, but also increase and sharpen sounds. A French-horn being greater at one end than at the other, increases the sound more than if the horn were of an equal bore: for the air and sound, being first contracted at the lesser end, and afterwards having more room to spread at the greater, dilate themselves; and in coming out strike more air, whereby the sound is rendered larger and deeper. And even hunters' horns, which are commonly made straight, not oblique as the former, are always greater at the lower end. It should be tried also in pipes, made much larger at the lower end: or with a belly towards the end, and then issuing in a straight concave again.

There is in St. James's fields a conduit of brick, with a low vault adjoining; and at the end of that, a round house of stone: in the brick conduit is a window; and in the round house, a small slit; so that when a person holloas in the slit, it makes a fearful roaring at the window. For all concaves that proceed from narrow to broad, amplify the sound at coming out.

Hawks'-bells, that have holes in the sides, give a greater ring, than if the pellet struck upon brass in the open air. For the sound enclosed by the sides of the bell, comes out at the holes unspent, and stronger. And in drums, the closeness round about, that preserves the sound from dispersing, makes the noise come out at the drum-holes, much louder and stronger, than if the like skin were struck, extended in the open air.

Sounds are heard better and farther in an evening, or in the night, than at noon, or in the day: because in the day, when the air is thinner, the sound pierces more; but when the air is thicker, as in the night, it spreads less: as being now in a degree of enclosure. It is true also, that the general silence of the night contributes to this effect.

There are two kinds of reflection in sound; the

one at a distance, or the echo; wherein the original is heard distinctly, and the reflection also distinctly: the other in concurrence; when the sound reflecting near, returns immediately upon the original, and so repeats it not but amplifies. Whence music upon the water sounds sweeter; and better in chambers that are wainscotted, than such as are hung.

The strings of a lute, viol, or virginal, give a much greater sound, on account of the knot and concavity beneath, than if there were only a flat board without that hollow and knot, by which the upper air communicates with the lower. An Irish harp admits the open air on both sides of the strings: and its belly runs not along with the strings, but lies at the end of them. It makes a more resonant sound than the bandora, orpharion, or cittern; though these have wire-strings as well as that. The cause seems to be, that the open air on both sides helps where there is a concavity; which is therefore best placed at the end. A virginal, when the lid is down, makes a slenderer sound than when the lid is up: for all shutting in of air, where there is no competent vent, damps the sound.

There is a church at Gloucester (and I have heard the like of other places) where, if a person speaks softly against a wall, another shall hear his voice better at a considerable distance than near at hand: inquire more particularly of the structure of that place. I suspect there is some vault, or hollow, or isle, behind the wall; and some passage to it from the farther end of that wall, against which the person speaks; so that the voice slides along the wall, then enters at some passage, and communicates with the air of the hollow: for it is somewhat preserved by the plain wall; but that is too weak to give an audible sound, till it has communicated with the back air.

Place the horn of the bow near your ear, then touch the string, and the sound will be increased to a degree of tone: the sensory, in this case, by reason of the near approach, being struck before the air disperses. The like happens, if the horn be held betwixt the teeth: but this is a plain propagation of the sound from the teeth to the organ of hearing; for there is a great intercourse between these two parts; as appears from hence, that a harsh, grating tune sets the teeth on edge. The same thing happens if the horn of the bow be applied to the temples; the sound thus sliding from hence to the ear. If a rod of iron, or brass, be held with one end to the ear, and the other be struck upon, it makes a much greater sound than the same stroke upon the rod, when not so contiguous to the ear. By which, and other instances, it should seem that sounds do not only slide upon the surface of a smooth body; but also communicate with the spirits in the pores of the body.

In Trinity College, Cambridge, there was an upper chamber, weak in the roof, and therefore supported by an iron prop, as thick as a man's wrist, placed in the middle of the chamber: which

iron, if struck, would make only a little flat noise in the room; but a great bomb in the chamber below. The sounds made by buckets in a well, when they strike against the sides, or plunge into the water, &c., are deeper and fuller than if the like percussion were made in the open air: on account of the confinement and enclosure of the air in the concave of the well. So empty barrels placed in a room under a chamber, make all the sounds in the chamber more full and resounding. Hence there are five general ways of increasing sounds—viz., 1. Simple enclosure; 2. Enclosure with dilatation; 3. Communication; 4. Approach to the sensory; and 5. Concurrent reflection.

With regard to exility of sounds; it is certain the voice passes through solid and hard bodies, if they be not too thick; and again, through water: but then the voice is, by such a passage, reduced to a great exility. Thus, if the holes of a hawk's bell be stopped, it will not ring, but rattle like the eagle stone, which contains another stone within it. And as for water; take a pail, turn the bottom upward, and carry the mouth of it down to the level of the water; plunge it six inches deep, still keeping it even, that it may not tilt on either side, and so get the air out: then let a person dive so far under water, as to put his head into the pail; and there will come out as much air in bubbles as to make room for his head. Now let him speak, and his voice will be heard plainly, though now made extremely sharp, like the mock-voice of puppets; yet the articulate sounds of the words will not be confounded. It may be more commodious to put the pail over a man's head above water; then, he sinking down, to press the pail down with him, so that by kneeling or sitting, he may be lower than the water.

In lutes, and stringed instruments, if you stop a string high, whereby it has less scope to tremble, the sound is more treble, but more dead. Take two saucers, and strike the edge of the one against the bottom of the other, within a pail of water; and as you put the saucers lower and lower, the sound will grow flatter, even while part of the saucer is above the water; but that flatness of sound is joined with a harshness, caused by its inequality, as coming from the parts of the saucer that are under the water. But when the saucer is wholly under the water, the sound becomes clearer, though much lower; as if it came from afar.

Soft bodies damp sound much more than hard ones. Thus, if a bell be wrapped round with cloth or silk, it deadens the sound more than if the bell were surrounded with wood. Trial was made in a recorder, and varied several ways: the bottom of it was stopped—1, with wax; 2, set against the palm of the hand; 3, against a damask cushion; 4, placed in sand; 5, placed in ashes; and 6, set half an inch deep in water, close to the bottom of a silver bason; and still the tone remained: but when the bottom of it

was set against—1, a woollen carpet; 2, a plush lining; 3, a lock of wool, though loose; and 4, against snow, the sound of it was quite deadened, and no more than a breath.

Hot iron produces not so good a sound as cold; for, while hot, it appears to be more soft, and less resounding. So likewise, warm water in falling makes not so full a sound as cold; being, I conceive, softer, and nearer the nature of oil; for it is more slippery, and scours better.

Let a recorder be made with two fipples, at each end one; the trunk as long as two recorders, and the holes answerable towards each end: let two persons play the same lesson upon it in unison; and observe whether the sound be confounded, or augmented, or deadened. So likewise, let a cross be made of two hollow trunks, and let two persons speak, or sing—the one lengthwise, the other transverse; and let there be two hearers at the opposite ends, to observe whether the sound be confounded, augmented, or deadened. These two instances will also give light to the mixture of sounds.

Bellows being blown in at the hole of a drum, whilst the drum beats, makes it sound a little flatter, without any other apparent alteration. The cause is, that the bellows in part prevent the issuing of the sound, and in part also make the air less moveable.

SECTION IV.

OF THE LOUDNESS OR SOFTNESS OF SOUNDS, AND THEIR PROPAGATION TO LONGER OR SHORTER DISTANCES.

The loudness and softness of sounds is a thing distinct from their magnitude and exility; for a bass string, though gently struck, gives the greater sound; but a treble string, if hard struck, will be heard much farther; because the bass string strikes more air, and the treble less, but sharper. The strength of percussion is, therefore, a principal cause of the loudness and softness of sounds; as in knocking harder or softer, winding a horn stronger or weaker, &c. And the strength of this percussion consists as much in the hardness of the body struck, as in the force of the striking body; for if you strike cloth, it gives a less sound; if with the same force, wood a greater; if metal, a still greater. And, in metals, gold gives the flatter sound; and silver, or brass, the more ringing sound. But air, where strongly confined, resembles a hard body; whence the loud noise in discharging a cannon. We find also, that a charge, whether with bullet, or paper, wet and hard stopped, or with powder alone, rammed hard, makes no great difference in the loudness of the report.

The sharpness or quickness of the percussion is a great cause of the loudness, as well as the strength. So if you strike the air with a whip, or a wand, the sharper and quicker it is done, the louder sound it makes. And in playing upon the lute, or virginal, the quick touch adds great

life to the sound; the quick stroke cutting the air suddenly; whilst the soft one rather beats than cuts it.

SECTION V.

ON THE COMMUNICATION OF SOUNDS.

An apt experiment for demonstrating the communication of sounds, is the chiming of bells; for if you strike with a hammer, first upon the upper part of the bell, then upon the middle, and lastly upon the lower part, you will find the sound to be more treble or more bass, according to the concavity on the inside, though the percussion be only on the outside.

When the sound in wind-instruments is produced between the blast of the mouth and the air of the instrument, it has yet some communication with the matter of the sides of the instrument, and the spirits therein contained; for in a flute, or trumpet, of wood and another of brass, the sound will be different: so if the flute be covered with cloth or silk, it gives a different sound from what it would do of itself; and if the flute be a little wet on the inside, it will make a different sound from the same flute dry.

SECTION VI.

OF THE EQUALITY AND INEQUALITY OF SOUNDS.

We come next to such inequality of sounds, as proceeds not from the nature of the bodies themselves, but is accidental; either through the roughness or obliquity of the passage, the doubling of the pecutient, or the trepidation of the motion. A bell if cracked, whereby the sound has not a clear passage, rings hoarse and jarring; so the human voice becomes hoarse, when, by a cold, the wind-pipe grows rugged and furred. And in these two instances the sounds are ungrateful, because totally unequal; but when unequal in equality, they prove grateful, though purling.

All instruments that have either returns, as trumpets; flexures, as cornets; or are elevated and depressed, as sackbuts; yield a purling sound; but the flute that has none of these inequalities, gives a clear sound. Yet the flute itself moistened a little on the inside, sounds more solemnly and with a degree of purling or hissing. And a wreathed string, such as the bass strings of a bandora, also yields a purling sound.

But a lute-string, if it be altogether unequal in its parts gives a harsh and untunable sound; which kind of strings we call false strings, as being bigger in one part than another: whence wire-strings are never false. So, to try a lute-string, we extend it hard between the fingers and fillip it; and if it give a double species, it is true; but if more it is false.

The running of waters affords a trembling noise; and in regals, which have a nightingale-pipe that contains water, the sound is continually tremulous. There is also a plaything for children called cocks, with water in them, which,

when blown into, yield a trembling sound; and this trembling of water has an affinity with the letter L. And all these inequalities of trepidation are rather pleasant than otherwise.

All bass, or very treble notes, give a rough sound; the bass striking more air than it can well strike equally; whilst the treble cuts the air so sharp, that it returns too swift to make the sound equal: and therefore the mean, or tenor, is the sweetest part in music.

We know nothing that can at pleasure make a musical or immusical sound, by voluntary motion, but the voice of man and birds. The cause is, no doubt, in the windpipe; which, being well extended, acquires an equality; as a bladder that is wrinkled becomes smooth when extended. The extension is always greater in tones than in speech; whence the inward voice, or whisper, can never give a tone. And in singing, there is a greater labour of the throat than in speaking; as appears from the thrusting out, or drawing in of the chin, when we sing. The humming of bees is an unequal buzzing, conceived, by some of the ancients, not to issue at the mouth of the creature, but to be an inward sound. It should rather seem to proceed from the motion of their wings, for it is not heard but when these stir.

All metals quenched in water give a hissing sound, (which has an affinity with the letter Z); notwithstanding the sound is created between the water or vapour, and the air. Boiling also, if there be but little water in a vessel, makes a hissing sound; but boiling in a full vessel makes a bubbling sound, somewhat like that of the cocks used by children.

Trial should be made, whether the inequality of the medium will not produce an inequality of sound; as if three bells were made, one within another, with air between them, and the outermost bell were chimed with a hammer; how would the sound differ from that of a single bell? So, likewise, join a plate of brass and a plank of wood together, and strike upon one of them, to try if they do not give an unequal sound. Again, make two or three partitions of wood in a hogsh-head, with holes or knots in them, and mark the difference of their sound from that of a hogsh-head without such partitions.

SECTION VII.

OF THE MORE TREBLE, AND THE MORE BASS TONES, OR MUSICAL SOUNDS.

'Tis evident that the percussion of a great quantity of air causes the bass sound, and the less quantity the treble. The percussion of the greater quantity of air proceeds from the largeness of the striking body, and the length and breadth of the concavity through which the sound passes; whence a bass string is greater; a bass flute, wider than a treble; and in pipes, and the like, the lower the note-holes are, and the farther from the mouth of the pipe, the more

bass the sound; and the nearer the mouth the more treble; so, if you strike an entire body, as an handiron of brass, at the top, it makes a more treble sound; and at the bottom, a more bass. 'Tis also evident that the sharper or quicker percussion of the air causes the more treble sound; and a slower, or heavier, the more bass sound. So, in strings, the more they are strained, the quicker they start back, and the more treble the sound; as, on the contrary, the slacker they are, the basser the sound; and hence, a bigger string more stretched, and a smaller string less stretched, may fall into the same tone.

Children and women have smaller and shriller voices than men, not because men have greater heat, which may make the voice stronger (for strength of voice regards only loudness and softness, not tone); but from the dilatation of the organ, which, indeed, may proceed from heat. But the cause of changing in the voice, at the years of puberty, is more obscure. It seems to be hence, that when much of the moisture of the body, which before watered the parts, is drawn down to the spermatc vessels, it leaves the body hotter; whence the dilatation of the organs; for all the effects of heat manifestly come on at this time, as pilosity, roughness of the skin, hardness of the flesh, &c.

The industry of musicians has invented two other ways of straining strings, besides winding; the one is, stopping them with the finger, as in neck of lutes, viols, &c., the other is by shortening the strings, as in harps, virginals, &c. Both these depend upon the same principle, as they only cause the string to give a quicker start. In straining of a string, the farther it is stretched the less super-straining goes to a note, for a string requires to be considerably wound before it will make any note at all; and in the stops of lutes, &c., the higher they go, the less distance there is between the frets.

If you fill a conical drinking-glass with water, then fillip it on the brim, and afterwards empty part of the water, and so more and more, still trying the tone by filipping, you will find the tone more bass, as the glass is more empty.

(To be continued.)

GLOUCESTER MUSICAL FESTIVAL.

THE one hundred and thirty-ninth of the musical festivals which alternately take place at Gloucester, Worcester, and Hereford, began this year on Tuesday, the 9th ult., at the first-mentioned city. It is almost needless to say that these great meetings are purely charitable in object—that object being the benefit of the widows and orphans of the poorer clergy of the three dioceses. Of late years the proceeds of the annual festival, in the way of collections and personal subscriptions, have averaged between a thousand and twelve hundred pounds, the sale of the tickets being appropriated to the payment of the expenses, which, in these days, are generally too heavy to leave the possibility of a surplus. The stewards this year, who act as guarantors, are more numerous than usual, comprising between fifty and sixty of the local magnates and neighbouring gentry, the Duke of Beaufort acting as president. We may mention at the outset, that the anticipations of

a successful festival appear to have been respectably realised, though not to the extent that could have been wished. The weather upon the whole has been favourable, and the attendance of visitors brilliant. The service in the cathedral which inaugurated the proceedings was intoned by the Rev. Mr. Clark, and the lessons for the day read by the Rev. Canon Harvey and the Rev. Mr. Crawley. The sermon was preached by the Bishop of Gloucester, who took for his text the 11th and 12th verses of the fifth chapter of Revelations. The service and the anthem, both by Croft, and the Preces of Tallis, were sung by the choirs of the three cities, strengthened by the lay clerks of Salisbury, Bath, Bristol, and Worcester, but the execution was by no means irreproachable—wherefore, it is hard to say, for the singers were the best of their class, and treading only upon familiar ground. The cathedral was crowded to the utmost. The novel feature of performing an oratorio on the same day as the opening service was not a profitable device on the part of the stewards. The sale of tickets scarcely reached 900, and the paucity of visitors presented a marked contrast to the thronged aspect of the cathedral but a short time before. The *Creation*, however, was magnificently given. The solos, sung by Mdlle. Titiens, Mr. Sims Reeves, and Mr. Weiss, fulfilled every desire. Mdlle. Titiens acquitted herself, as she seldom fails to do, to admiration. Her delivery of Haydn's attractive music gratified the most critical expectation, and exhibited the full perfection of which the art is capable. The minor vocal parts were allotted to Miss Eleonora Wilkinson, Mr. Montem Smith, and Mr. Winn, who were extremely efficient. The lady is yet a novice, though of considerable promise. The chorusses were given broadly and vigorously. The subsequent evening concert in the Shire Hall was attended better than the first of the miscellaneous concerts usually is. The programme was as inviting as it was various. It opened with Meyerbeer's international overture—which, however, was very indifferently executed—followed by selections from *Acis and Galatea*, and a copious list of separate vocalities by Balfe, Verdi, Donizetti, Bishop, and other composers, there being no novelty, excepting a very pretty song by Mr. Howard Glover, "They offer rank," written expressly for Mdlle. Titiens, who, it is unnecessary to remark, rendered it the amplest justice. Verdi's cantata, performed at Her Majesty's Theatre, was also an ingredient in the scheme. The singers, besides Mdlle. Titiens, were Mdlle. Parepa, Madame Sainton-Dolby, Madame Laura Baxter, Miss Wilkinson, Mr. Sims Reeves, Mr. Weiss, Mr. Winn, Signor Bossi, and Mr. Montem Smith. M. Sainton was also present as a contributor of his popular violin fantasia on Scotch airs. The attendance of visitors on Wednesday morning at the cathedral, when *Elijah* was performed, was manifestly an improvement upon that of the day before, when the *Creation* was given. Mendelssohn's great work was listened to with peculiar interest—the interest that never fails to be awakened when hearing it in a cathedral edifice. Praise may be awarded generally to the performance. The principal soprano music fell to the lot of Mdlle. Titiens, whose declamation of the majestic "Hear ye Israel" was faultless. The well known trio, "Lift thine eyes," was another of the remarkable events of the morning, Mdlle. Titiens, Madame Laura Baxter, and Madame Sainton-Dolby being the exponents. That most consoling, and at the same time fascinating, of airs, "Oh rest in the Lord," was given by Madame Sainton-Dolby in her usual earnest and impressive manner. The oratorio, throughout, as regarded the principals, was exceedingly well rendered. The double quartett in the first part, "For He shall give his angels," was unexceptionable; while the episodes of the widow and the prophet, the discomfiture of the Baalite priests, and the supplications for rain, were developed with masterly care and effect. The principal singers, in addition to those we have mentioned, were Mr. Sims Reeves, Mr. Montem Smith, Miss Wilkinson, Mr. Winn, and Mr. Weiss—the last-mentioned vocalist distinguishing himself very honourably, as usual, in the part of the prophet. The chorusses were not sung wholly